Standard #: MAFS.912.A-SSE.2.4

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Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments. ★

Subject Area: Mathematics	**Grade:** 912
Domain-Subdomain: Algebra: Seeing Structure in Expressions	**Cluster:** Level 3: Strategic Thinking & Complex Reasoning
Cluster: Write expressions in equivalent forms to solve problems. (Algebra 1 - Supporting Cluster) (Algebra 2 - Major Cluster) - Clusters should not be sorted from Major to Supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting clusters.	**Date Adopted or Revised:** 02/14
Content Complexity Rating: Level 3: Strategic Thinking & Complex Reasoning - More Information	**Date of Last Rating:** 02/14
Status: State Board Approved	

Related Courses

Course Number	Course Title
1200320:	Algebra 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200330:	Algebra 2 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200340:	Algebra 2 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1207310:	Liberal Arts Mathematics (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200500:	Advanced Algebra with Financial Applications (Specifically in versions: 2014 - 2015 (course terminated))
1200335:	Algebra 2 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2019 (course terminated))
7912095:	Access Algebra 2 (Specifically in versions: 2016 - 2018, 2018 - 2019, 2019 and beyond (current))
1200387:	Financial Algebra (Specifically in versions: 2016 and beyond (current))

Related Resources

Problem-Solving Task

Name	Description
A Lifetime of Savings:	The purpose of this instructional task is to give students an opportunity to construct and find the value of a geometric series (A-SSE.4) in a financial literacy context. The task assumes that students have already developed the formula for a geometric series themselves; having them recognize the need for this formula (and look up if necessary) allows them to engage in MP 5, Use appropriate tools strategically. The task also provides students with an opportunity to look for and express regularity in repeated reasoning (MP 8), as the solution shows. This task also asks students to interpret the variables in the future value formula in the context of the problem (A-SSE.1).
Cantor Set:	This task leads to the generation of finite geometric series with a common ratio less than one as a means to explore properties of the Cantor Set. The Cantor Set is a fascinating set with many intriguing properties. It contains uncountably many points, which means that there are "as many" points in it as on the real line, yet the set contains no intervals of real numbers and it has length zero. All that is necessary to show that it has length zero is to look at what happens to a geometric series as we add more and more terms.
Course of Antibiotics:	In this task, students consider a real-world problem involving the decay of a drug in a patient's body. This task presents a real world application of finite geometric series. The context can lead into several interesting follow-up questions and projects. Many drugs only become effective after the amount in the body builds up to a certain level. This can be modeled very well with geometric series.
Triangle Series:	Students consider a diagram of five nested equilateral triangles diminishing in size according to a geometric series. The purpose of this task is to emphasize the adjective "geometric" in the "geometric" series, namely, that the algebraic notion of a common ratio between terms corresponds to the geometric notion of a repeated similarity transformation. Specifically, since the black triangles are all similar with the same scale factor, the total area of the black triangles is a geometric series. This task could be used either to introduce the geometric series as a worthy object of study, or as a geometric application of its use.

Virtual Manipulative

Name	Description

Geometric and Harmonic Series- Limits:	This applet allows users to set up various geometric series with a visual representation of the successive terms, and the corresponding sum of those terms.

Tutorial

Name	Description
Geometric series:	Geometric series

Assessment

Name	Description
Sample 1 - High School Algebra 2 State Interim Assessment:	This is a State Interim Assessment for 9th-12th grades.
Sample 2 - High School Algebra 2 State Interim Assessment:	This is a State Interim Assessment for 9th-12th grades.
Sample 3 - High School Algebra 2 State Interim Assessment:	This is a State Interim Assessment for 9th-12th grades.

Student Resources

Name	Description
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Cantor Set:	This task leads to the generation of finite geometric series with a common ratio less than one as a means to explore properties of the Cantor Set. The Cantor Set is a fascinating set with many intriguing properties. It contains uncountably many points, which means that there are "as many" points in it as on the real line, yet the set contains no intervals of real numbers and it has length zero. All that is necessary to show that it has length zero is to look at what happens to a geometric series as we add more and more terms.
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Geometric and Harmonic Series- Limits:	This applet allows users to set up various geometric series with a visual representation of the successive terms, and the corresponding sum of those terms.
Geometric series:	Geometric series
Triangle Series:	Students consider a diagram of five nested equilateral triangles diminishing in size according to a geometric series. The purpose of this task is to emphasize the adjective "geometric" in the "geometric" series, namely, that the algebraic notion of a common ratio between terms corresponds to the geometric notion of a repeated similarity transformation. Specifically, since the black triangles are all similar with the same scale factor, the total area of the black triangles is a geometric series. This task could be used either to introduce the geometric series as a worthy object of study, or as a geometric application of its use.

Parent Resources

Name	Description
A Lifetime of Savings:	The purpose of this instructional task is to give students an opportunity to construct and find the value of a geometric series (A-SSE.4) in a financial literacy context. The task assumes that students have already developed the formula for a geometric series themselves; having them recognize the need for this formula (and look up if necessary) allows them to engage in MP 5, Use appropriate tools strategically. The task also provides students with an opportunity to look for and express regularity in repeated reasoning (MP 8), as the solution shows. This task also asks students to interpret the variables in the future value formula in the context of the problem (A-SSE.1).
Cantor Set:	This task leads to the generation of finite geometric series with a common ratio less than one as a means to explore properties of the Cantor Set. The Cantor Set is a fascinating set with many intriguing properties. It contains uncountably many points, which means that there are "as many" points in it as on the real line, yet the set contains no intervals of real numbers and it has length zero. All that is necessary to show that it has length zero is to look at what happens to a geometric series as we add more and more terms.
Course of Antibiotics:	In this task, students consider a real-world problem involving the decay of a drug in a patient's body. This task presents a real world application of finite geometric series. The context can lead into several interesting follow-up questions and projects. Many drugs only become effective after the amount in the body builds up to a certain level. This can be modeled very well with geometric series.

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